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Garden Irises



Iris sibirica
Major de Bry
1640.



THE HISTORY of floriculture shows that some flowers more than others receive the attention of both professional and amateur gardeners, and of these a few have been developed and perfected to such degrees of refinement that they have become the objects of collective search.

The excesses of the one-time tulip mania probably will never be repeated; but there are to-day several flowers which are in great popular favor, with notable collections, both small and large, and with great centers of activity in the gardens of hybridists in this country and in Europe. The wealth of the ages is available for our gardens, and there is no treasury richer than that of the iris.

GARDEN IRISES

By B. Y. MORRISON, *Horticulturist, Office of Horticultural Investigations,
Bureau of Plant Industry*

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THE APPEAL OF THE IRIS

IN THE GARDEN of the busy man or woman there should be no plants which require undue care or attention. This is especially true of the flower garden on a farm, where labor is spent of necessity upon the vital activities of the farm business and where it is the exception rather than the rule to find any individual with leisure enough to tend an elaborate flower garden.

If the farmer has a garden where he grows flowers other than shrubs, which make the largest show for a minimum of care, there is no candidate more worthy than the iris. It is to be had in a variety of colors and forms equaled by few hardy plants, is tolerant of many adverse conditions, is subject to attacks from few diseases and insects, and is relatively permanent. To be sure, it is not possible to have identical collections in Minnesota and Florida, in California and Massachusetts, but there are desirable species and varieties deserving the attention of each grower, who can often modify conditions to include a wider range than would at first appear possible.

DISTRIBUTION

The iris as a genus is confined to the Northern Hemisphere and completely encircles the globe. Its members are found from the edge of the arctic regions down to the shores of the Gulf of Mexico and of the Mediterranean. There are varieties which grow in bogs that are perpetually bogs, others that revel in bogs that afterwards become burning wastes, varieties that grow along the edges of the desert, others that grow in countries with marked dry seasons, and a great many that flourish with average conditions of climate and soil.

From the study of the geographical distribution of the iris, it appears that the two centers of original location are central and southern Europe and the Orient, especially China. For the most part, however, the exotic species are thoroughly at home on the American continent and in certain sections have established themselves as freely as any native plant.

SURVEY OF BOTANICAL TYPES

BEARDLESS IRISES

As might be expected in a plant which has so wide a geographical range through such varying climatic conditions, there are many

different forms of irises, and these are used by the botanists in arranging the species in their natural groups. Some members of these groups are not available or desirable for garden purposes, and they are purposely omitted from the brief presentation that follows.

The first characteristic which makes a distinct division among the wild irises of the world is the nature of the plant, some being furnished with rhizomes and others with bulbs. (Fig. 1.) The plants which have rhizomes are easily grouped by certain structural characteristics of the flowers and of the rhizome. The garden irises which have bulbs are in turn separated into two groups by the nature of the roots which come from the bulb—simple roots in one case and enlarged fleshy roots of more than annual duration in the other.

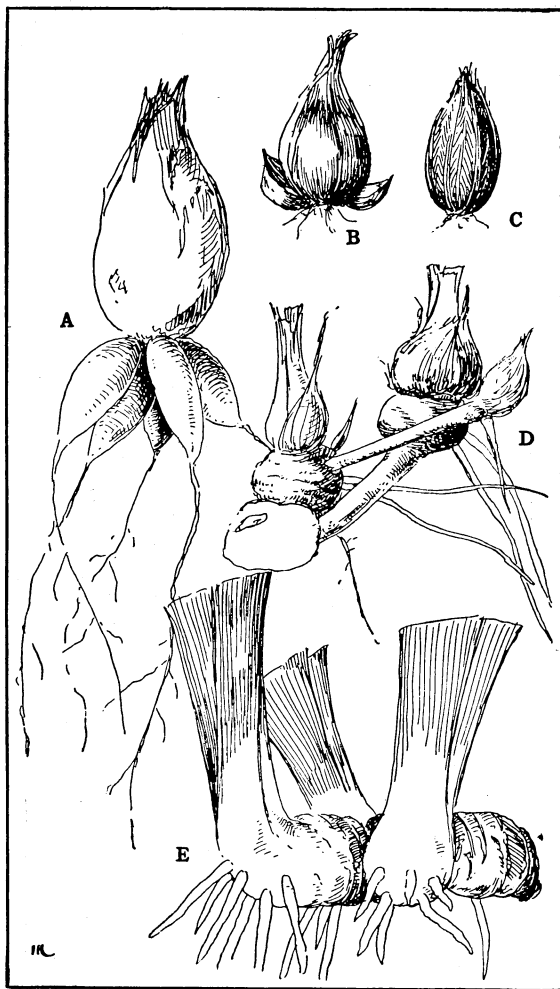


FIG. 1.—Types of iris roots: A, Bulb of an iris of the Juno group; B, bulb of an iris of the Xiphium group; C, bulb of an iris of the Reticulata group; D, rhizome of an iris of the Regelia group; E, rhizome of an iris of the Pogoniris group

For the gardener the two most important groups of the rhizomatous form are those known as the apogons, or bearded irises, and the pogons, or beardless irises.

The first group is a very large one and contains many diverse forms. The most common garden examples are the Siberian and Japanese irises. All of these irises object to lime, and nearly all

prefer moist rather than dry situations. Special requirements are noted in the several descriptions.

The Siberian iris (*Iris sibirica* L.) is the most important member of a group of small-flowered oriental species which are entirely hardy and of great value to the gardener. (Fig. 2.) The plant grows from a slender rhizome, which divides, forming compact clumps producing dense tufts of slender grasslike foliage from 10 inches to several feet high. The light-green foliage is lax and graceful, making a nice appearance in the border even when there are no blooms. The flowers are borne on very tall slender stems, ranging from 3 to 4 feet in height. There are some geographical

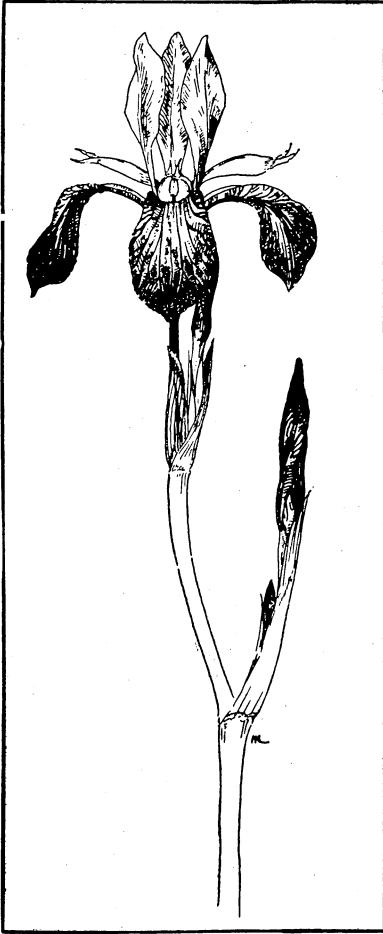


FIG. 2.—*Iris sibirica*



FIG. 3.—*Iris orientalis*

variations, however, in which the flowers scarcely overtop the foliage, and still others in which the whole plant is dwarf. Garden hybrids with *Iris orientalis* appear and form an intermediate series, in which are included all shades of blue-purple from the very darkest to faintly tinted, as well as pure white.

The plants are successful in any moist garden soil and look especially well when planted upon the shores of streams and ponds, but not in such positions as would be covered with water in the win-

ter; for, although the plant is winter hardy in the extreme, it can not survive freezing in saturated soil. If fertilizer is needed, it should be old well-decayed manure but not bone meal, which is used freely on many other kinds of irises.

The plants are propagated by division of the clumps in spring or in late summer, but show preference for spring moving. All the



FIG. 4.—*Iris chrysographes* (at left); *I. wilsoni* (at right)

varieties come freely from seed, which should be sown as soon as it ripens in pots in a coldframe or in the open ground in mild climates. The pots or seed bed should be kept rather dry, to discourage germination in autumn. The following spring, as soon as the seedlings are of sufficient size to handle, they should be pricked out into beds in which the soil is full of humus. Here they frequently come into flower the spring after germination, but more often require two years to reach maturity, after which they soon form large clumps.

Iris orientalis Thunb. is a species (fig. 3) which was grouped under *Iris sibirica* for many years. It is even more common in gardens than the Siberian iris. They are similar in most respects, except that the plant of *Iris orientalis* is stouter in all its parts and that the flowers have larger

falls (see fig. 49) and are borne on stems that scarcely top the foliage. Its hybrid forms, which perhaps have in them some of the blood of *Iris sibirica*, have taller stems and in the cases of the varieties Blue King, Emperor, and Snow Queen are notably fine plants. In culture and propagation the species are alike.

A few species closely related to *Iris sibirica* are found in gardens but are for the collector rather than the amateur, with the possible

exception of *Iris prismatica* Pursh, a charming slender iris native of the swamps and moist meadows of the northern United States. *Iris forresti* Dykes has beautiful pale-yellow flowers, as has *Iris wilsoni* Wright (fig. 4); *Iris chrysographes* Dykes (fig. 4) bears gorgeous royal-purple flowers with intense gold marked on the falls; and *Iris butleyana* Dykes has deep lavender flowers mottled with rosy purple. All of these have flowered in the writer's garden, but *Iris wilsoni* alone persists in fair health, and similar reports are known from most of the Eastern States for all save *Iris chrysographes*, which is sometimes contented.

The Japanese irises have a horticultural origin in which it is be-

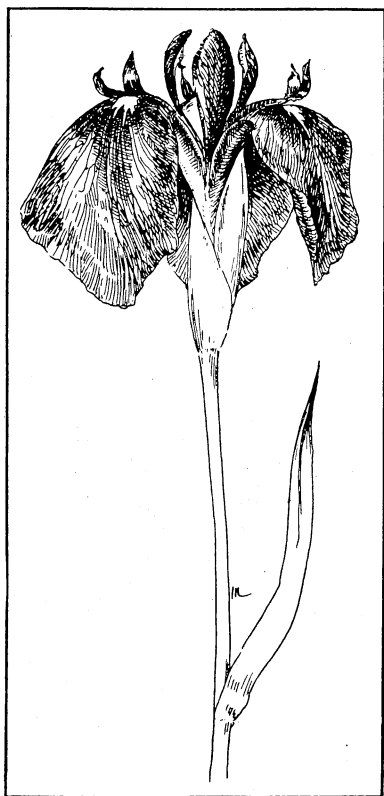


FIG. 5.—*Iris kaempferi*

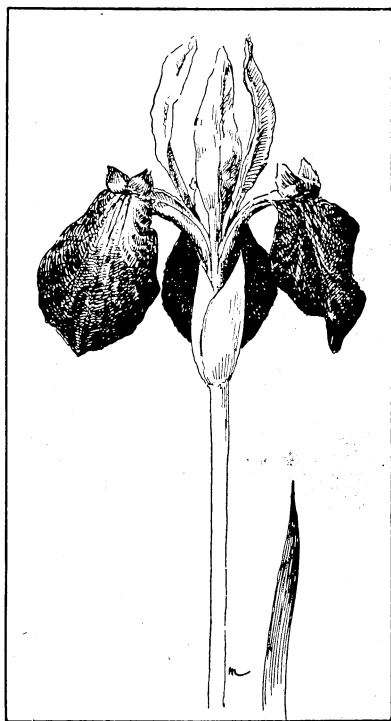


FIG. 6.—*Iris laevigata*

lieved that *Iris kaempferi* Siebold has been the predominating factor. This is borne out by the evidence that seedlings from the named Japanese irises often revert in part to small forms which closely resemble the wild *Iris kaempferi* (fig. 5). Unfortunately we shall never know what other species were involved, as there are no available Japanese records. The other species native to Japan which might have been used are *Iris laevigata* Fischer (fig. 6), which is largely grown in its several forms, and *Iris setosa* Pallas, which also occurs but is not used in the Japanese gardens.

All the Japanese irises (fig. 7) are beautiful in flower, though some are finer than others, the chief faults appearing in varieties in

which the flowers are too heavy to be held erect and in colors which are not clear but mottled and streaked. This objection does not extend to those varieties which are distinctly veined or are marked with bands or zones of clear color.

The plants should be propagated by division or by seed and treated like the Siberian irises, noting only that to obtain the finest blooms extra feeding with liquid manure should be given just before blossoming. It should be remembered also that seedlings will vary greatly in color and size of flower and that the plants which are

given ample food will require more frequent division than irises left to ordinary border culture.

Irises of another group in this section are not so widely grown as they should be, their chief fault being that they are slow of establishment after transplanting. These are the irises of the *Spuria* group and are most often represented by *Iris ochroleuca* L., one of the most beautiful, especially on the Pacific coast, where it forms huge clumps. This iris is a striking garden plant, with stiff leaves 3 to 4 feet high, with taller stalks bearing large white flowers, each with an intense yellow blotch on the falls. *Iris spuria* L. itself (fig. 8) is similar in shape and size, but has flowers of varying shades of lavender.



FIG. 7.—A Japanese iris

Iris aurea Lindley is a gorgeous deep-yellow form with rather wider falls than the others.

All of these, together with the hybrids between *Iris spuria* and *Iris monnieri*, are plants that require full sun, an abundance of water during the spring, and a thorough rest in the late summer, preferably with a natural climate of heat and drought. In spite of this they do well in the Eastern States and are hardy as far north as New Hampshire. When successfully established they should not be disturbed. Propagate by division in spring or immediately after flowering, if this does not precede a seasonal drought. Propaga-

tion by seeds is very slow and not worth while in ordinary garden practice.

One other small closely related iris is the dwarf *Iris graminea* L. (fig. 9), which should be in all collections on account of its curious flowers and its delightful fragrance, a scent recalling that of freesias. It rarely exceeds a foot in height, so it should be used in the front of the border, where it is entirely satisfied with ordinary garden conditions.

Another garden iris of common occurrence is *Iris pseudacorus* L., the common yellow-flag iris of Europe (fig. 10), of most robust nature, growing freely both in sun and in shade, in dry and in moist situations. For its best development it should be grown in the open with an abundant supply of water. It increases rapidly, soon forming heavy clumps with 4 to 6 foot straplike leaves and flowering stalks scarcely as high. There are many flowers on each stalk, varying considerably in size and in shade of yellow, approaching pure white in some forms, and also in the amount of brown reticulation on the falls.

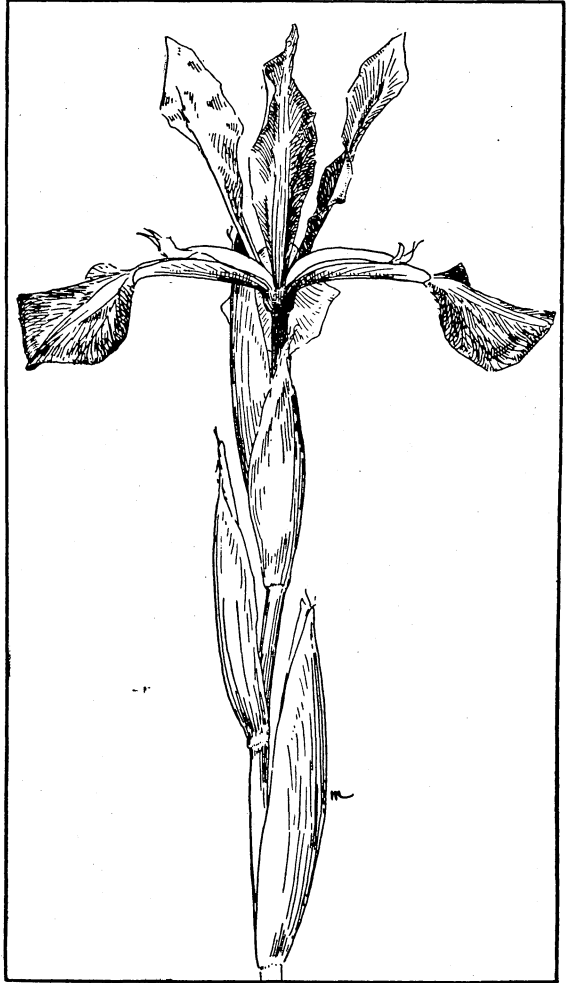


FIG. 8.—*Iris spuria*

This iris is too coarse for most garden plantings, but is admirable for the shores of ponds and streams, where its thick masses of roots bind the soil tightly and prevent its washing away. If grown in gardens the flower stalks should be cut when the last flower fades, to prevent the formation of seeds, which if left to ripen sow themselves and become a weedlike nuisance.

Iris versicolor L., the common blueflag of the prairies (fig. 11), is the American counterpart of *Iris pseudacorus*, though it never

reaches the same large size and its flowers are in shades of lavender varying to white, but never yellow. It, too, is useful only for landscape plantings, unless one happens to find a form which is unusually free flowering, as most plants produce so great a mass of foliage that the flower stalks are far outnumbered.

Two other groups of American irises should be noted—the wild irises of the South and those of the Pacific coast. The former are three closely related species—*Iris hexagona* Walter, *Iris foliosa* Mackensie and Bush, and *Iris fulva* Ker-Gawl. All of these grow naturally in wet if

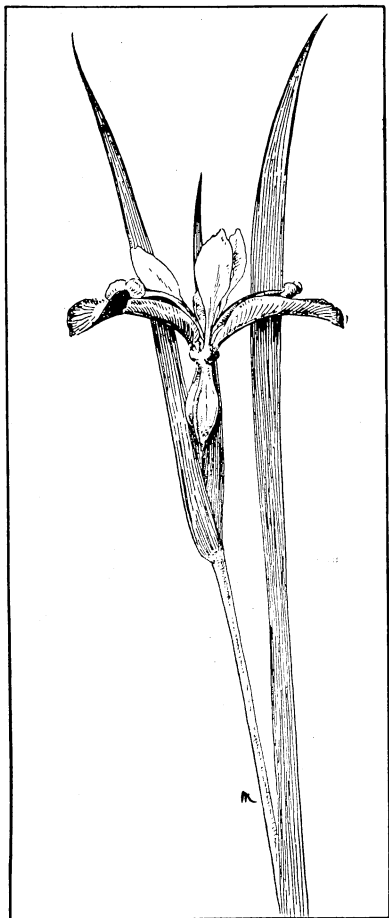


FIG. 9.—*Iris graminea*



FIG. 10.—*Iris pseudacorus*

not swampy places, but thrive very well in ordinary garden soils. *Iris hexagona* is the most tender and *Iris foliosa* the most hardy. The flowers of all are of good size and widely expanded, clear terra-cotta colored in *Iris fulva*, a reddish purple in *Iris hexagona*, and a clear blue lavender in *Iris foliosa* (fig. 12). Pure-white forms appear at times in both *Iris hexagona* and *Iris foliosa*, but are not long lived in most gardens. The plants are easily propagated by division or by seed, which often requires two years for germination. These species are best used as small clumps in

the border, and in the case of *Iris foliosa* as a ground cover in half-shaded areas.

The other notable American species are those from the Pacific coast. These are dwarf plants for the most part, with charming little flowers of very delicate coloring. They are somewhat difficult to manage in gardens and are not successful in any climate where winter cold destroys the evergreen foliage. Plants should be secured just as the new growths are starting, as the very scanty root growth is all made at that time. Transplanting should be done as little as possible, because the root system is always meager and the rhizomes are so slender that they perish before new roots can be formed. One of the easiest spe-

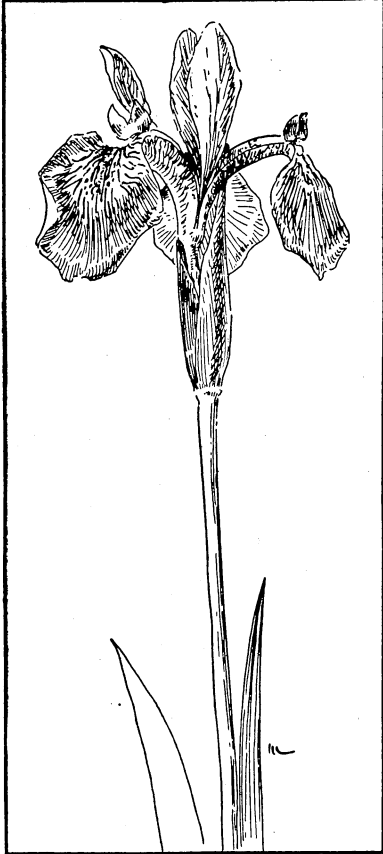


FIG. 11.—*Iris versicolor*



FIG. 12.—*Iris foliosa*

cies to manage in the East has been *Iris douglasiana* Herbert (fig. 13), which has flowers of cream color and lavender, often veined on the falls with darker colors.

Iris purdyi Eastwood and *Iris bracteata* S. Watson are similar save in the stem characters. *Iris tenax* Douglas from the northern part of the Pacific slope is hardier and more easily grown, but the easiest of all is *Iris longipetala* Herbert, which grows in close clumps with stiff grayish green foliage, slender stalks bearing charming flowers of characteristic shape (fig. 14), and delicate pale-lilac color-

ing. This is related to *Iris missouriensis* Nuttall of the Rocky Mountain regions and *Iris montana* Dykes, a kindred form; and all are of easy growth in the Eastern States as compared with species from the wooded slopes of the coast countries.

Although the preceding paragraphs do not cover all the interesting irises of the beardless section, they include the most important groups for garden uses. There remain, however, three totally unrelated species which should have passing mention because of their special characteristics.



FIG. 13.—*Iris douglasiana*

Least important of these is a native southern iris, *Iris tripetala* Walter (fig. 15), which is related to *Iris setosa* and shares with it the distinction of having standards so reduced in size that they are almost nonexistent. It grows freely in a soil rich in humus and bears its slender lavender flowers late in June, at the same time as the Japanese irises. It should be planted where it can form a mat of foliage, as it spreads by wide stoloniferous offshoots and soon covers a considerable area.

Iris unguicularis Poirét (fig. 16) is a charming evergreen iris from the Mediterranean regions. Its value is chiefly for the South

and the Pacific coast, for its flowering season is from November to March. The writer has grown it for years at Washington, but it rarely flowers, because the destruction of the evergreen foliage each winter reduces the vigor of the plant. In several long autumns and in one mild February it blossomed and pushed up its lovely flowers in the frosty air. They are of a beautiful lavender color in the type, but there is an exquisite white form.

This variety should be given a position where it will be hot and dry during the late summer and a soil that is not too rich if an abundance of flowers is desired. Propagation is by division of the roots as growth starts in the spring.

Iris dichotoma Pallas (fig. 17), the third and most interesting of all, is widely distributed in



FIG. 14.—*Iris longipetala*



FIG. 15.—*Iris tripetala*

China and is questionably hardy as far north as Boston. It produces tall branching stalks of flowers during the late summer. The stems are leafy, and in general habit the plant resembles the blackberry-lily (*Belamcanda chinensis* DC.). The flowers themselves are small, commonly ivory white with chocolate and dull-purple blotches; but there is a lavender form rather smaller than the type, and among seedlings the writer has a lovely pure-white form.

The plant is easily raised from seed, and this is the best way to increase it, as it seems to resent transplanting even in the spring. It requires no special soil, but prefers a rather well drained situation.

The flowers are small but are very freely produced and make a fine show in late August or early September, in spite of the fact that each lasts but a day and does not open until the early afternoon.

ONCOCYCLUS AND REGELIA IRISES

Oncocyclus and Regelia irises are very beautiful and interesting plants from Asia Minor, Palestine, and Syria. They are of difficult

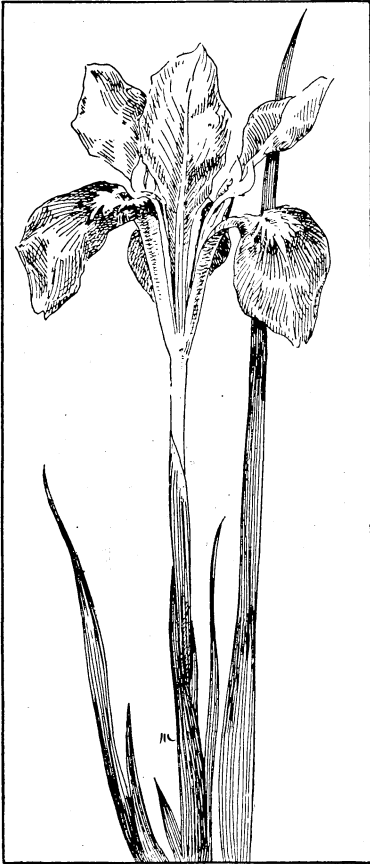


FIG. 16.—*Iris unguicularis*



FIG. 17.—*Iris dichotoma*

culture in gardens except in southern California, where climatic conditions are similar to those of their habitat.

Botanically they are characterized by seeds with conspicuous arils, rhizomes of short cushionlike growth, and the *Oncocyclus* species by a diffuse hairy beard on the falls.

Because they are occasionally found in gardens, these irises should be mentioned. For the most part their roots are entirely hardy, but the tops are not, which results disastrously when the plants start into quick growth with the first autumn rains, only to be frozen and destroyed in November.

On the Pacific coast and in the regions where there are marked dry and wet seasons they are more at home, for the autumnal rains are cold and retard the growth until early flowering in March.

In the Regelia group, *Iris korolkowi* (fig. 18) and its several varieties are much easier to manage than *Iris susiana* (fig. 19) of the Oncocyclus group, the other species commonly cultivated, but both prefer a thorough drying in the summer. This can be accomplished by lifting the plant as soon as the foliage shows signs of ripening and storing the rhizomes in a dry state until

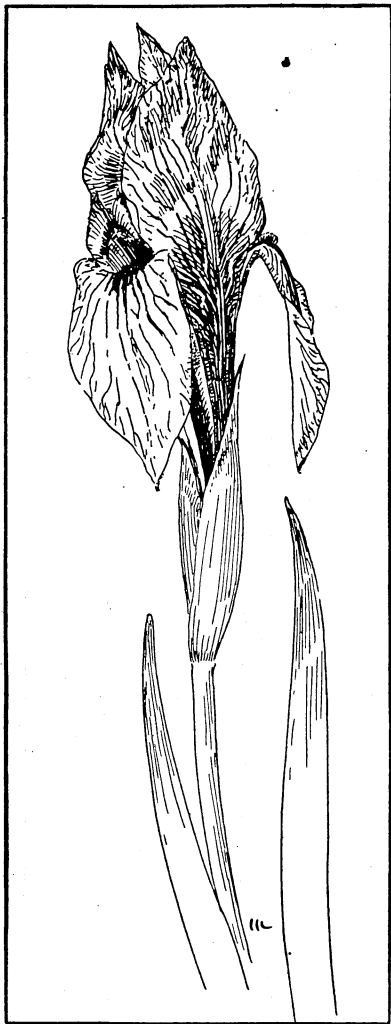


FIG. 18.—*Iris korolkowi*

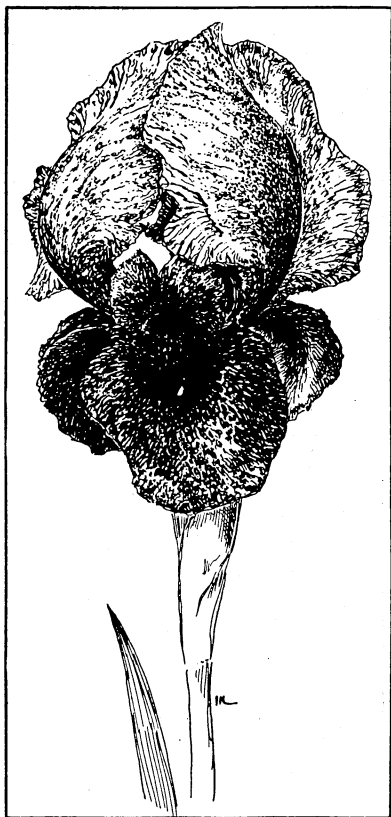


FIG. 19.—*Iris susiana*

midautumn, or until the soil is too cold to encourage top growth but not too cold to encourage root action.

Many hybrids between the groups have been made, resulting in wonderfully beautiful flowers (fig. 20), which show some advance in hardiness over their parents but are greatly benefited by similar treatment. Hybrids with members of the Pogoniris group, however, are much hardier but often much less beautiful.

BEARDED IRISES

Bearded irises are the best known of the garden sorts. They are plants of varying stature and size, but all are characterized by stout rhizomes, more or less evergreen foliage, and for the most part brilliant flowers in many shades, each flower bearing on the falls a linear beard of various colors, though commonly yellow.

The bearded sorts are of easy culture if certain fundamentals are observed. All of them prefer shallow planting in sunny well-drained locations in a deep well-worked soil. If planted in connection with other plants they should be arranged so that their

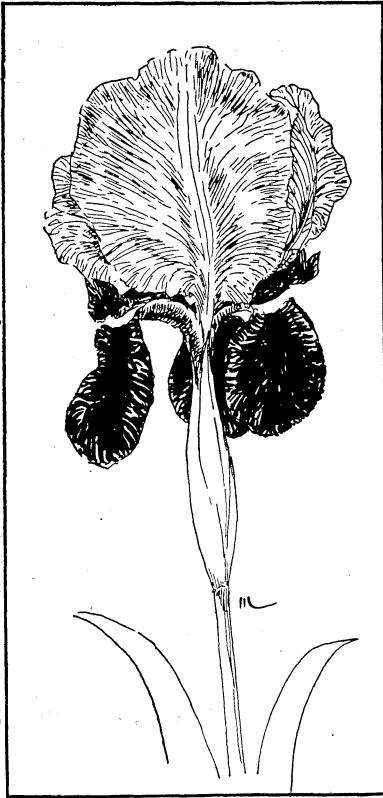


FIG. 20.—A Regello-cyclus hybrid iris

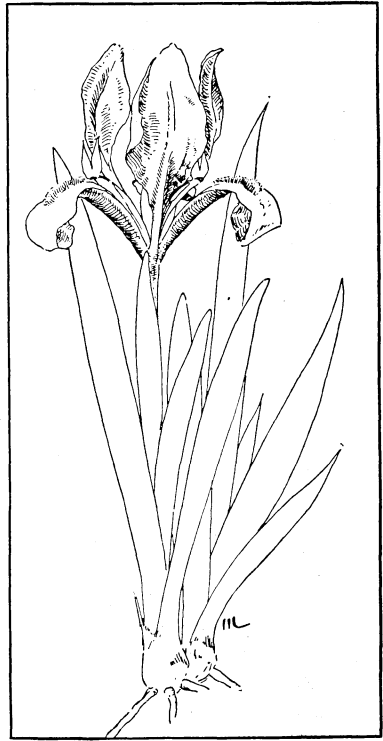


FIG. 21.—*Iris pumila*

surface roots are not overshadowed by foliage, especially in the late summer when the rhizomes are being ripened for the next season's flowering.

Nearly all varieties multiply rapidly into clumps which maintain themselves in fair condition almost indefinitely. For the best results, however, the clumps should be lifted, divided, and reset every fourth year, with an adequate remaking of the soil in the border. This operation should be carried out immediately after the blossoming season, but may be delayed until the early autumn. In regions where there is a sharp drought in midsummer it may be wise to wait

until this has passed, unless water can be given to counteract the season and to stimulate root action.

To obtain varieties true to name these irises must always be propagated by division of the roots. Seeds are sometimes produced naturally and can be obtained with some freedom by hand pollination. The practice in planting the seeds varies somewhat. The writer prefers immediate planting, but other workers prefer later planting and have most satisfactory results. The chief possible danger of delay is an excessive drying of the hard seeds, which delays but does not prevent germination. Normally this should come the spring after planting, and the seedlings should grow enough in the season to flower the following spring.



FIG. 22.—*Iris albicans*



FIG. 23.—*Innocenza*

It must be remembered, however, that the seedlings will not necessarily resemble their parents and in many cases will be greatly inferior to them.

In the wild there are several centers of bearded irises in which the members of the group show similarity of characters. These are the irises that grow through northern and central Europe, those of Asia Minor, and those of India. These groups, of course, are overlapping, not sharply defined, and vary within themselves.

Very few of the wild species play a conspicuous part in garden work. The dwarf irises of Europe are represented freely in *Iris pumila* L. (fig. 21) and *Iris chamaeiris* Bertolini, and these have

been mixed to a degree with hybrids of other dwarf European species. Of the tall-growing European species *Iris germanica* L. is the most common, with *Iris albicans* Lange (fig. 22) next. The wild types of *Iris pallida* Lamarck and *Iris variegata* L. are rarely grown, as they are now far surpassed by garden forms. From Asia Minor there is *Iris trojana* Kerner, and in favored localities *Iris junonia* Schott and Kotschy and *Iris mesopotamica* Dykes may also be grown. The Indian group is represented by *Iris kashmiriana* Baker, but this thrives only in mild climates.



FIG. 24.—*Iris florentina*



FIG. 25.—Courcy

A certain confusion has arisen in the literature of the iris from the one-time practice of naming some of the early hybrids, both of natural and garden origin, as though they were species instead of garden forms. In time these came to be grouped merely as horticultural forms, but during the last few years interbreeding has been carried on to such an extent that it is almost impossible to place the new varieties in any semibotanical classification, with the result that most gardeners frankly group them by colors, with some notation of the pedigree—a most important item, especially for gardens in the North.

The discussion that follows is therefore based entirely on the garden point of view.

Purely as a matter of convenience the first consideration might be given to the dwarf European species. These are interesting little plants, rarely exceeding 10 inches in height and usually much less than that. There are many color forms in the trade, both of the dwarf stemless *Iris pumila* and of the taller *Iris chamaeiris*. The clearest colors in each case are the reds, violets, and purples. The yellow varieties are oftener tinged with dull olive or purple and the whites with green or slate blue. Almost all forms set seed freely and multiply with considerable rapidity. Because they are dwarf they should be planted near the front of the garden border in irregular patches rather than in formal edgings. The seeds if sown before winter germinate the following spring and soon grow to flowering size. The named varieties — Cyanea, Schneekuppe, White-Edge, Orange Queen, and Bride—make a reasonable selection of colors for any garden. *Iris lurida* is of similar stature but of unknown origin and although it may have little botanical relation to this group is valuable in that it adds the touch of mahogany-red color to those mentioned; it requires similar treatment. The specialist will take pleasure also in *Iris flavis-sima* Pallas, the sand iris, a charming small plant, not over 4 inches high, which



FIG. 26.—Chlorinda

requires a hot location in sandy soil. Where it flourishes it spreads into small open clumps which bear fair-sized golden yellow flowers that open only in the sunlight and last but a day.

Between these irises and the earliest flowering of the tall bearded sorts, with an admixture of *Regelia* and *Oncocyclus* species, some of the early workers, notably Caparne, of Guernsey, England, raised many hybrids which are intermediate in almost all points between their parents and have been so called in the trade lists. They are of greatest use in making continuous the iris season between the April blooming dwarf irises and the May and June flowering tall irises. Ingeborg, Ivorine, Helge, Walhalla, King Christian, Prince Victor, and Blue Boy make a good selection of varieties now in commerce.

Before the mass of named varieties of the late-flowering, tall, bearded iris the amateur may well stand dismayed. This is the group which has received the full impetus of the revival of interest in the iris, and to it have been made the contributions of the many hybridizers who have worked through the last few years.

These are known often as German irises, a most unfortunate common name, inasmuch as it is based upon the false assumptions

that the varieties are all related to the Linnaean species *Iris germanica*, a species which is now questioned by many botanists as of possible hybrid origin, and that that species is a native of Germany.

In the older catalogues and literature certain group classifications were maintained with semibotanical names, which in the first years served well enough. Since then interbreeding and the introduction of new blood have destroyed many of the definitive characteristics which established the classification.

The best groupings offered so far for the classification of these irises are color groups, in spite of the fact that one is immediately confronted by the difficulties arising from lack of a common understanding of color terms. Individual varieties can

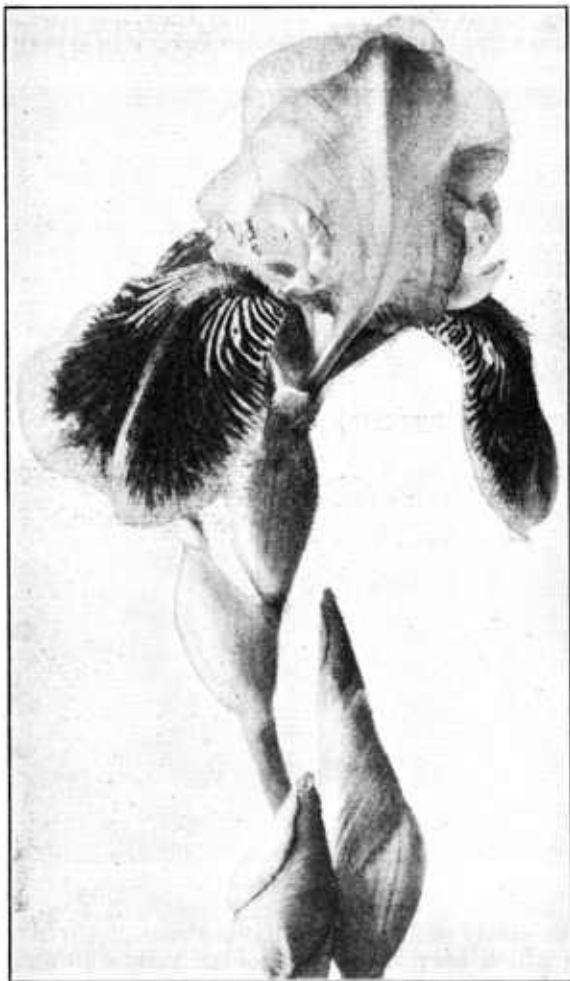


FIG. 27.—Monsignor

be described with absolute accuracy by use of some standard color chart, but such definiteness can not be extended to large groups.

Beginning with the white varieties, there is a group in which are included the truly white ones, as, for example, *Iris albicans* (fig. 22); those which are white with some colored reticulations in the throat, as in *Innocenza* (fig. 23) or *Mrs. Horace Darwin*; those of white faintly washed or tinted with color, but still counting for white in

garden effect, as in *Iris florentina* (fig. 24), and perhaps as in *Pan-croft*, which may be taken as the other extreme of tinting; and finally those irises which are faintly reticulated with color over their entire surface or along the borders of the segments, as in *Courcy* (fig. 25), *Madame Chereau*, and *Ma Mie*. This explanation alone shows the looseness of the classification, but garden use, which shows all these irises as truly white in effect, warrants the scheme.

Among the self-colored yellows there is little confusion, as they are relatively few in number and



FIG. 28.—Eldorado



FIG. 29.—Demi-deuil

limited in range of tint. Among them should be included also those few varieties, like *Minnehaha* and *Chlorinda* (fig. 26), which are sparsely reticulated in color on the falls.

Similarly, there is no particular difficulty in grouping irises with a strong difference in the colors of the standards and falls. There are those with dark (often velvety) purple falls and standards of shades varying from pure white, as in *Rhein Nixe* and *Thorbecke*, to dark lavender, as in *Monsignor* (fig. 27) or *Nine Wells*. Corre-

spondingly, there are those in which the standards are of some hue of yellow with falls dark as before but of rather dull purple, brown, or reddish tone, as in Nibelungen or Knysna.

The great difficulty comes in grouping the large number of irises which are of lavender and its related shades.



FIG. 30.—Merlin

Lavender, lilac, and purple all come from the admixture of blue and red in various proportions, and a further series can be made by diluting all these colors with white or by slightly dulling or neutralizing them toward gray.

In iris flowers there is no true blue, for in every case there is blended some red, and the nearest approach that one finds to pure blue is in those flowers, such as Celeste or Moonstone, in which the color is a very dilute tint of lavender containing little red. For these reasons the terms "lavender" and "violet," which are commonly used to describe the iris color, have been hyphenated, and the classification divides those closely related colors into two groups, the red-violets and the blue-violets. In the first group are all those irises in which the color shows slightly

more of red than of blue, whether it be in the intense purple of *Parc de Neuilly* or in the dilute Chinese violet of such varieties as *Mrs. Alan Gray*, *Pauline*, or *Edouard Michel*. The classification further divides into groups those varieties which are self-colored and those which are bicolored. It does not include those varieties, however, in which the difference in the texture of the fall is apparent as well as

the difference in color. For example, Oriflamme is a blue-violet bicolor of this group and not of the group of which Monsignor, Perfection, and Nine Wells are examples. Most irises of this group trace their origin to *Iris trojana* or *Iris amas*, whereas the bicolors with a velvety texture have somewhere in their lineage *Iris variegata*. This may not be immediately apparent in the known lineage, but it has appeared in all the breeding experiments of the writer and in others known to him.

There remains a large group of irises, which is constantly increasing as the work of the modern breeder continues. This is the group in which two or more colors are blended in a single petal. If the resulting color is alike in fall and standard the blends are spoken of as self-blends, but if there is a sharp differentiation in standards and falls the plant is called a blended bicolor. Eldorado (fig. 28), Quaker Lady, and Afterglow are examples of the first type and Isoline, Jacquesiana, and Arnolds of the latter.

A single group remains which has appeared in its extreme examples in the group of whites. It is the group of flowers in which the pigment is confined to the veins, whether over the entire surface or along the margins. When it appears only on the margins in very slight amounts or over the entire surface in very light colors, as in Mrs. Reuthe, the iris appears as white; but when the border color is dark, as in Madame Chereau, E. L. Crandall, or Francina, or over the entire surface, as in Parisiana, Madame Chobaut, or Mercedes, the flower takes the predominating hue as its garden color. It is interesting to note here that these irises, originally known only in shades of lavender or violet on white, now include faint yellows, as in Pancroft, Montezuma, and Onnoris, browns, as in Demi-deuil (fig. 29) and Madame Denis, as well as deep mauve, as in Parisiana and Mercedes.

Although specific varieties have been named to illustrate the points made, there is no permanent value in listing varieties for garden planting at this particular time when breeders and growers alike have brought to the iris a wave of popularity which is by no means at its peak, but a few generalizations as to the selection of varieties may be of value. Varieties in which the blood of *Iris variegata* appears in not too dilute amounts are more commonly hardy in the northernmost States than many others. The pure pallidas and cengialtis are also hardy, but varieties in which appear the blood of *Iris amas*, *Iris trojana*, *Iris mesopotamica*, or *Iris ricardi* are relatively less hardy. It is not always possible to tell the parentage of varieties, but there are a few features which often betray origin. *Iris amas* bequeaths its offspring low stature with flowers of good size, commonly held fairly close to the stem, together with a slow rate of increase and a type of rhizome division that is very characteristic. There is also a tendency to shy flowering. Although it has never been stated, to the writer's knowledge, Oriflamme is probably from this source, and such varieties as Lord of June, Halo, Myth, Merlin (fig. 30), and Rangoon all point to amas blood. *Iris trojana* and *Iris mesopotamica* both produce seedlings of large size with tall widely branching stems, sometimes too weak to bear up the flower. Alcazar, Caterina, Asia, and Impresario (fig. 31) are

excellent examples of these irises. They do best in climates not severe enough to injure the strong tufts of foliage which develop in the late autumn. For this reason these irises reach their optimum development on the Pacific coast.

CRESTED IRISES

Crested irises are very lovely and two of their species should be found in every good garden. The one is *Iris cristata* Solander (fig. 32), a native of the eastern United States, extending westward through the mountain regions to the shores of the Great Lakes in the North and to the Ozarks in the South. It is a dwarf species with creeping rhizomes and broad green leaves about 6 inches high that form a delicate carpet through which appear the brilliant pale-lavender flowers with their crested falls marked in white and orange. There is much delicate variation both in coloring and



FIG. 31.—Impresario



FIG. 32.—*Iris cristata*

amount of these markings, but not sufficient to distinguish varieties save in the pure-white form with its crested golden blotch.

Iris cristata is easily propagated by division in the spring, before active growth commences, or in late summer. It prefers a cool soil in semishade. Seed is produced freely, but seedlings never appear in the gardens the writer has known and he has had no success in germinating seed ripened in his own garden. The plant would make an excellent ground cover.

The other charming representative of crested irises is the still smaller *Iris gracilipes* A. Gray (fig. 33) from Japan. This is of similar stature but has narrow leaves of a distinct yellow-green color and dwarf branching stems which bear small rosy lavender flowers marked with white and yellow.

In both the preceding species the crests which distinguish the members of this group are small and inconspicuous, but in *Iris tectorum* Maxim (fig. 34), the other semihardy member of this division common in this country, the crest is a distinct addition to the beauty of the flower. This iris is of the easiest culture in any good garden soil either in shade or sun, but suffers in climates where the winter is severe

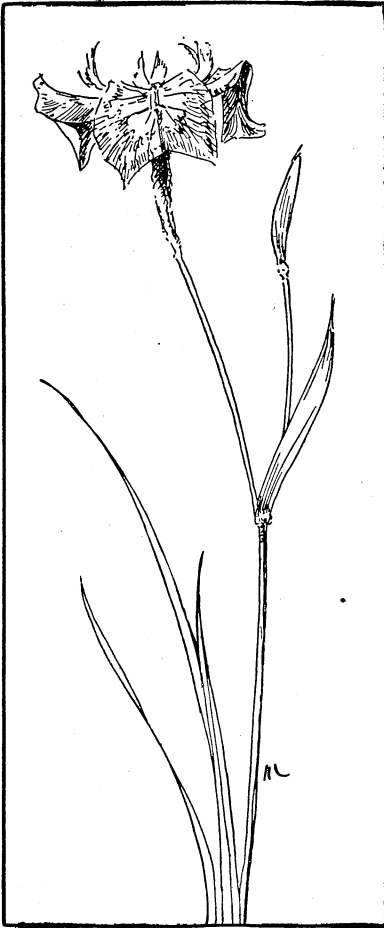


FIG. 33.—*Iris gracilipes*



FIG. 34.—*Iris tectorum*

enough to freeze the evergreen foliage. This so reduces the strength of the plant that the little vigor remaining is not sufficient to produce good flowers. In frost-free climates it grows almost too luxuriantly, so much so that it produces great sheaves of broad foliage and no flowers. It seeds freely, and the young seedlings come quickly to flowering.

The plant is apparently more or less indifferent to lime and requires no special care in the matters of watering or drought.

There is an exquisite white form which comes true from seed if self-pollinated.

BULBOUS IRISES

THE XIPHIMUM GROUP

The bulbous species of most use to the American grower are the so-called Spanish, English, and Dutch irises.

The Spanish irises are a strain of more or less uncertain origin. They embrace many color forms and are the result of years of patient evolution at the hands of European growers. The typical wild form of *Iris xiphium* L., which is the accepted original species, is blue. The horticultural forms can now be had in far more colors than the original blue of



FIG. 35.—*Iris xiphium*



FIG. 36.—Dutch iris

the wild iris. There are few records definite enough to determine whether the color variations have arisen purely in variations from seed or sport or by the intermixture of the blood of allied species, few of which have come into culture themselves. The Spanish irises are slender plants with very narrow leaves and flower stalks about 18 inches high, bearing at most two flowers of a very characteristic shape not duplicated elsewhere in the family except to a degree in the Spuria groups of the rhizomatous section. Figure 35 shows most clearly the slender form of the perianth segments with the erect standards and narrow falls almost covered by the overarching style arms.

The nearest relations of the Spanish irises are to be found in the new race of Dutch irises (fig. 36), which are similar in most of their parts and differ chiefly in somewhat earlier flowering, in size, and in heavier petal texture. It is interesting to know that this race was brought about in an attempt to discover the origin of the Spanish irises by various crosses of *Iris xiphium* L., with its variety *prae-cox*, *Iris filifolia* Boiss., *Iris lusitanica* Ker-Gawl., and others.

Both Spanish and Dutch irises are of easy culture in most regions. They do not thrive in the extreme North or in any climate where the autumn growth is likely to be injured by frosts. An autumn growth of foliage appears in many irises and is a safe indication of origin in regions where there are no severe winters, winters at least lacking in heavy snows and repeated freezing and thawing. In the case of the Spanish iris the growth is rarely more than a single spear-like leaf, which attains a height of 6 or more inches in the late fall and remains so throughout the winter except in the South and on the Pacific coast, where the mild weather in one case and the winter rains in the other encourage continuous growth and a correspondingly early flowering.

The irises in the Xiphium group prefer a sunny rich soil of moderate moisture during the early summer and of some dryness during the late summer. In regions such as the Middle Atlantic States, where frequent summer rains would often work havoc with them, the danger can be overcome by planting in soils that are light, warm, and thoroughly drained. In such soils they are relatively permanent but slow of increase.

These irises can be grown from seed, which is often freely produced; but the small bulbs take a long time to reach flowering size, and the formation of seed so reduces the strength of the bulb that it is often prevented from flowering the following year.

At the present time these irises are chiefly cultivated on the Pacific coast and in lesser numbers in the South. They are found in many gardens throughout the Eastern States, where they have been permanent for years.

These irises are essentially garden flowers, as the plant is of too delicate a structure to hold its own in any landscape planting. For this reason they should be planted in groups, never singly, and should be surrounded by perennials that will partly occupy the space left by the ripening of their flower stalks. Care should be taken that they are not overcrowded, as the sun must reach the soil to ripen the bulbs sufficiently for next year's flowering.

Perhaps a size larger in all parts than either of these irises and later flowering in season are the English irises (*Iris xiphoides* Ehrh.). These have been introduced into this country with some difficulty, on account of the losses in transit, and are not well known. They are reported to be succeeding excellently in the State of Washington, where they seed freely and where the seedlings come to maturity after a tolerable delay.

The chief advantage of the English over the Spanish irises is a larger flower with better developed blade in the fall. They are taller and require a moister soil than the Spanish irises; and they do not have the range of coloring, as there are no yellow or bronze varieties. They are both alike, however, in being strictly garden plants.

All members of this group are valuable for cut flowers, as they can be forced gently, and unlike most irises they stand transportation well.

THE RETICULATA GROUP

The Reticulata group can be given only passing mention because it is practically not available for the average grower. However, there are scattered over the country many isolated gardens in which old clumps remain and delight the owners in early spring with their richly colored flowers (fig. 37). They are reported to prefer an alkaline soil of a light rather than a heavy nature.

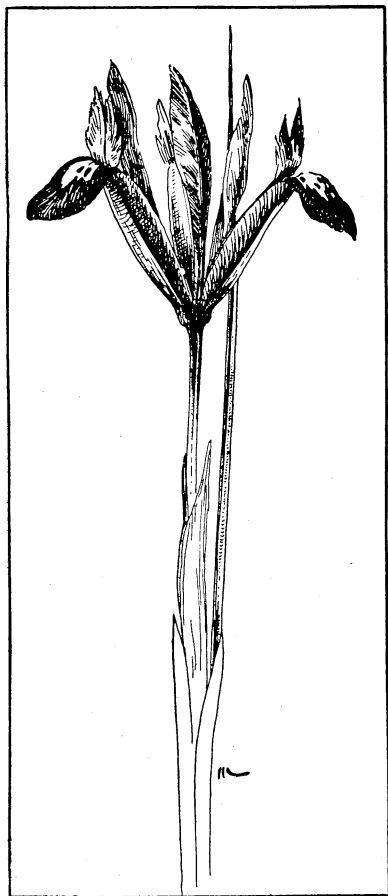


FIG. 37.—*Iris reticulata*

THE JUNO GROUP

The Juno group of irises, like the preceding, is rarely to be met in gardens of this country but would probably succeed admirably in many sections.

The large bulbs (see fig. 1) are almost as impatient of disturbance as are peonies, because of inevitable injuries to the storage roots; but when once the plants are established in a warm, rich soil they increase to clumps and form interesting members of the garden family. They always attract attention, because they are early flowering, blooming immediately after the dwarf pumilas, and because of their unusual appearance. Unlike all other irises they develop a stalk upon which the leaves are borne, forming a plant strikingly like a miniature Indian corn. In the axils of the upper leaves are borne the brilliantly colored flowers.

In the writer's experience the small *Iris rosenbachiana* Regel is the first to appear, in mild winters flowering in late February in the vicinity of Washington, D. C. In

it the short stems are not developed at flowering time, and the blooms seem to rise successively from the enfolding sheaths at the surface of the ground. The flowers are variable in color, but are mostly of rosy lavender with markings of darker purple and gold. *Iris orchoides* Carrière in its typical yellow form (fig. 38) and its white and blue varieties follows quickly, and later comes the gorgeous *Iris bucharica* Foster, with white standards and deep golden yellow falls. There are other members of this group of equal or greater beauty, but they have not been grown by the writer.

Those grown have flourished and increased in deep garden soil of light texture with full exposure to the sun. Seed is produced freely by *Iris bucharica* and moderately by the other sorts mentioned, but the resulting seedlings are slow of growth. The one drawback in the culture of these sorts is their early growth with consequent susceptibility to early frosts. In cold climates they should be given some protection, not for the bulbs, which seem entirely hardy, but for the foliage. In frost-free regions they should develop amazingly.

In this résumé of the botanical groups the gardener can find an indication of nearly every kind and type of iris he is likely to meet in his garden experiences. Many of them are of more botanical than horticultural interest to beginners, but those which have been described are easily within the skill of the careful cultivator. This review does not include the descriptions of the masses of horticultural varieties, which are constantly changing and are usually adequately described in the trade lists and in the bulletins of the American Iris Society.

GARDEN USES

When one considers any flower to determine its merits there are three points of view from which it must be judged: The viewpoint of the landscape architect, that of the gardener, and that of the florist. Few flowers are of equal value to all three. The florist's roses are often valueless in the garden and of still less value in landscape planting.

The iris follows an inverse ratio. Very few are of value to the florist, nearly all are of prime importance to the gardener, and many are of value to the landscape gardener in naturalistic plantings.

To be of value to a florist a flower, quite aside from its sentimental characteristics, must have qualities of petal and shape of



FIG. 38.—*Iris orchinoides*

bloom which will facilitate shipping in a cut state and have a moderate duration after sale. It must also have a season of bloom, either natural or forced, which will not encroach upon the established seasonal flowers, unless it has sufficient quality and character to usurp their market position.

The iris of to-day does not meet these requirements. Its flowers are fugitive, of very delicate substance, with few exceptions easily spoiled even with the most careful handling, and again with few exceptions blooming naturally at times when the market is glutted with bloom. It is forced with great difficulty. There are notable exceptions in the Spanish and Dutch irises and some few of their allies, notably *Iris tingitana* Boiss. and Reuter, which if forced moderately yield excellent flowers for cutting purposes. For the best results the bulbs used must come from regions where they are adequately ripened by summer heat and drought. They should not be forced until after New Year's and should be grown slowly, as too rapid forcing will cause the bulbs to come blind. The flowers can be cut when the color shows in the bud and shipped even from Los Angeles to Chicago before the petals unfold.

Other irises can be used for cutting and for decorations if grown and used locally, but commercially they are scarcely worth the effort of production.

In the garden, however, the story is very different. Here there are few flowers which yield so lavish a return for so small an effort. In the mixed border the iris furnishes the most important climax of bloom after the spring bulbs. In nearly all localities they follow closely after the Darwin and May flowering tulips, the last of the tulips often combining charmingly with the earliest irises. In the border the plants should be spaced so that they can develop into clumps strong enough to carry 8 to 10 stalks of bloom. It is absolutely essential that the plants surrounding them should not grow over them after their flowering season, as shade over the rhizomes prevents the proper ripening of growth and results in the curtailing of bloom the next year. The flower buds for the next season are formed in late summer or early autumn and develop best when the plants are otherwise inactive save for root growth. For this reason it is better to do any transplanting either before or after this time.

As to the arrangement of varieties, much must be left to personal taste. A few general suggestions are permissible. Better effects are secured oftentimes by the gradation of colors rather than by alternations of contrasting hues. For example, gradations from white through pale yellow to dark yellows and bronzes, through pale lavenders to dark purples, or through pale pinks to dark red-violets are all more likely to be effective than a sequence of white, purple, yellow, pink, lavender, bronze, and so on. Nevertheless, in mass plantings of either light or dark sorts it pays to introduce clumps of dark or light varieties merely to give accent to the mass. At other times it is better to secure this by means of some other plant than iris, such as *hemerocallis* or early-flowering peonies. *Hemerocallis* blooms in their shades of pale yellow and orange are particularly effective with the lavender and purple irises, whereas peonies in white and pale pink are better with irises of pink or mauve shades.

or of pale blue-lavenders. To darker purples or violets the stronger, clearer pinks of the peony often give a faded appearance.

In planning garden borders with thought for color effect, remember also that certain colors carry rather differently than might be expected and certain others do not carry at all. This must be guarded against, especially in varieties which are bicolors or blends of several tints. For example, the variety Rhein Nixe, which has white standards and falls of light violet bordered with white, is for all purposes a white iris in the garden. The violet color on the falls is too weak to carry far and the pure white is so conspicuous that it dominates the flower. This same effect is to be noticed in the varieties Gajus, Loreley, and Princess Victoria Louise, in all of which the luminous yellow standards eclipse the colored falls. Among blended varieties, Quaker Lady will serve as an example. This charming sort is a mixture of buff and pink and violet with distinct yellow in the throat. In garden mass it tells as a warm pinkish buff of rather dull color which does not carry well unless set off by a dark-green foliage background or by some variety of clear light color. Isoline and Merlin, which are blended varieties, show very clearly in garden masses as pink-toned irises, though on closer inspection they prove to be far from pink, even of such pinks as irises can boast.

For the person who is particularly interested in color effects, a study of the effect of light on color is of value in planning the garden, both in choosing its site and in deciding the location of surrounding plantings. As one must have sunlight in abundance to insure the health of his plants, the question is whether a strong shadow for part of the day or light moving shadows are more attractive.

Of the gardens known to the writer those in which there are long shadows cast by distant trees both in morning and evening, together with some light shade from small flowering trees during midday, have most beautiful light effects. The cool lights of morning and evening illuminate the delicate tissues of the petals in a very characteristic way, and this effect is lessened if there are trees of considerable size in the garden area to darken or obstruct this light. There should be some small trees, however, to break the furious heat of noon, a heat which destroys and fades the colors of all the light-hued flowers. For this purpose such trees as the flowering dogwood, Japanese styrax, flowering crab apples, cherries, and Chinese magnolias are of use, and climbing roses trained on pillars or posts make a pleasant break in the plantings.

If the garden is unavoidably in the shadow cast by a building or dense woods, plan the beds or borders so that varieties of clear colors are more in shadow than those of blended hues, as the latter are dependent upon sunlight for their best appearance.

There is a growing tendency to have gardens in which the planting is almost exclusively of irises. (Fig. 39.) This has great advantages for the irises themselves in that the entire area can be given a treatment especially adapted to them. Furthermore, the masses of flowers make as charming a sight as one can well imagine. There are certain objections to this plan, however, which should be faced. Even in climates where all the unusual irises can be grown, those that

bloom in late winter and in late fall, there is but one season when the garden is literally ablaze with flowers, and that season is scarcely more than two months in duration even with the most careful planning and scheming. During the remaining season the foliage masses are rather dull and uninteresting, especially during July, when many kinds are ripening off the spring foliage and have not yet produced the autumn growth. These conditions may be accepted frankly and the garden treated as a "green garden" with adequate

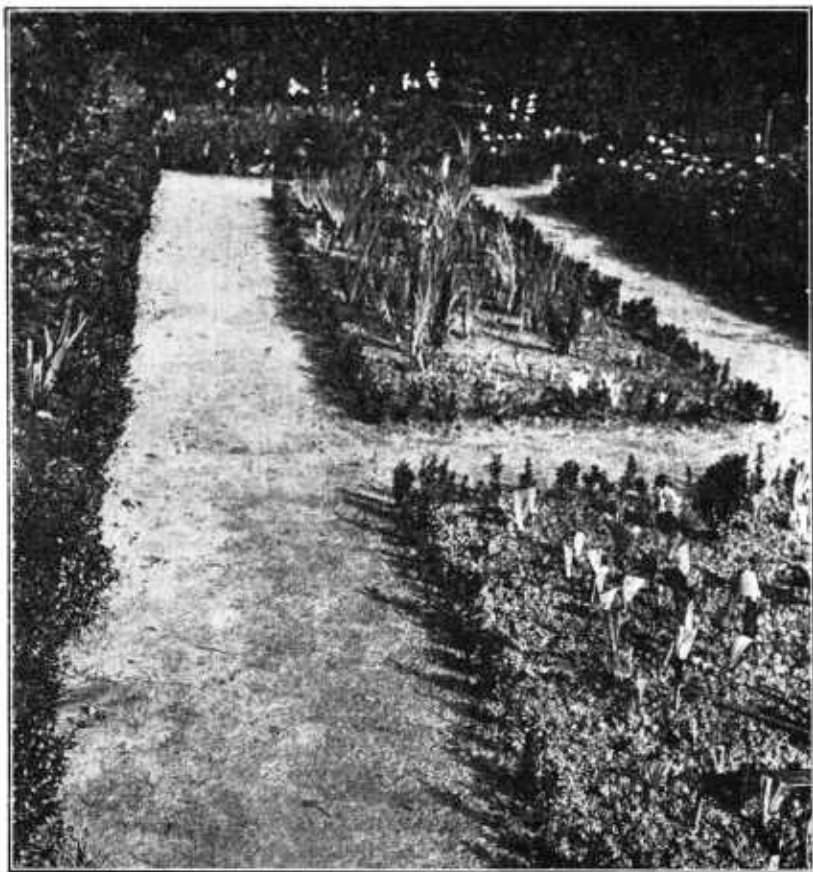


FIG. 39.—Iris garden, showing newly transplanted iris

interest furnished by the masses of iris foliage, by the turf of paths which should be of ample width, and by the foliage of surrounding trees and shrubs. In the writer's garden the paths have been bordered by box, which gives definition to the areas and adds rich dark-green masses of texture sharply contrasting with the iris masses. French marigolds sown rather late are planted near the fronts of the borders in the spaces left bare by vanished clumps of narcissus foliage, and these, together with incidental bushes of lavender and common bluebeard (*Caryopteris incana* Miq.), make a secondary dis-

play in late autumn. Sometimes chrysanthemums are added as isolated specimens for later effect, and the ever-increasing collection of summer-flowering *hemerocallis* has added other bits to the garden color. Other annuals that are useful in such gardens and which become established in the latitude of Washington, D. C., are *cleome*, *petunia*, and *nigella*, and the Chinese balsams and cosmos can be used, as their root run is slight, and if they are widely spaced no harm is done the irises.

When the designer wishes to use the iris with a view to securing even broader and more informal effects he must proceed with some caution in the choice of varieties.



FIG. 40.—Siberian iris by the waterside

LANDSCAPE USES

Although irises are among the most permanent and enduring of perennials, they are not capable of caring for themselves indefinitely, especially if they are to furnish good annual bloom. The kinds chosen for this use should be those which are most like the wild species. This sort of planting is found commonly on the shores of ponds or streams in broad open meadows, whether alone or in conjunction with tree and shrub plantings. Here irises may be planted by the hundred or by the thousand with wonderful seasonal effect. (Fig. 40.)

For waterside plantings (fig. 41) none are better than the English flag (*Iris pseudacorus* L.) and the native blueflag (*Iris versicolor* L.). These are as nearly permanent as trees or shrubs, and once established they seed themselves indefinitely through the area. Both will succeed in actual marsh conditions and endure considerable freezing even in water-logged soils. The Japanese *Iris orientalis* is perhaps the nearest rival of these two species, as it is of almost equal endurance, but in very old clumps there is a tendency to stop flowering and to die from overcrowding. This is quickly noticeable when the plants are growing in shade. Almost equally strong are the Siberian irises. These are rather more dependent on moisture than the last named, but should be planted well above the water line in marshland. The Japanese irises themselves are not



FIG. 41.—*Iris pseudacorus* by the waterside

so valuable for extensive plantings of a semiwild nature. They are strictly horticultural varieties and need garden care. If this can be given there is no more gorgeous sight than a great mass of these huge irises in bloom. They require rich soil, full sun, an ample water supply, especially during the blooming season, and division of the plants every third or fourth year.

The bearded irises have never been thoroughly examined and tested for use in naturalistic plantings. The permanence of the common blue form of *Iris germanica* in the dooryards of the country and the reported establishment of *Iris florentina* and *Iris albicans* in the South would point to their successful use through many regions. Gardeners who have had occasion to dump discarded varieties are often surprised at their flowering under most unfavorable circumstances. It is probable, however, that one should be guided in this matter by the geographical location of his planting

and in the colder regions use only such varieties as have their origin in the species which are found to be native of the colder regions of Europe, leaving for the southern plantings those forms which have in them the blood of southern species. This will mean that for the northern planting the descendants of *Iris pallida* and *Iris variegata* will furnish the essential varieties, and in the South the derivatives of *Iris trojana* and *Iris mesopotamica* may be added.

In such plantings it is desirable to use single varieties in bold groups rather than mixtures of many colors. There is no particular lack of harmony in the use of mixed varieties unless by chance there comes the juxtaposition of strong yellow and cerise or magenta varieties, but there is a distinct gain in mass effect if there is a strong grouping of single varieties.

In choosing, it is well to remember that many of the pleasant refinements of tint and marking are lost in distinct views or may even become detrimental. For example, the variety Eldorado, which shows an interesting blend of dull gold and heliotrope close at hand, is a rather more dull affair at a hundred yards, and Parisiana, with its intricate veining and speckling of mauve on a white ground, appears as a dull-purple iris from a distance. Again, varieties like Princess Victoria Louise, with luminous standards and dull falls, carry chiefly as a small lemon-tinted flower. For this reason clear-colored sorts, like all the *pallida* varieties in their shades of lavender, mauve, and Chinese violet, the clear-yellow *Flavescens*, and some of the yellow *variegatas*, the sharp, clear bicolors, like Perfection and Nine Wells, all appear to greater advantage in masses than the other sorts. If the designer wishes to vary the tint within each group, to grade his lavenders from the almost white varieties, like Moonstone or Celeste, through all the intermediate steps to the dark purple of Parc de Neuilly, he adds greatly to the interest. The same sort of thing can be done in yellows, from the ivory white of Pancroft to the deep yellow of Mrs. Neubronner, or in the so-called pinks, from the tinted white of Wyomissing to the deep Chinese violets of Caprice or Edouard Michel or even on into the red purples of Opera and Archeveque.

To combine these contrasting color groups requires rather more skill. Usually the yellows are best used near the blue lavenders, avoiding the red lavenders unless the sharp contrast of pale yellow with deep mauves is desired. For the landscape sharp contrasts are less interesting than gentle gradations and even when purposely sought lose somewhat from the fact that the strong sunlight destroys some of the effect.

In arranging the plants within the groups and determining the shapes of the areas to be planted it will be found that masses which are longer than wide are of more attractive appearance than areas nearly equal in all their dimensions. In garden work the planting may be reduced at times to a single line of plants, which mature quickly into strong clumps with many flower stems. In landscape plantings of any considerable size such a scheme would appear too thin and feeble, and the designer must use his judgment in determining the width of the planting for his particular plan, remembering that the distance from which the planting must be viewed will make the apparent size of the area much smaller than is actually the case.

The colors in the planting areas may be arranged in solid blocks which extend across the tract, or they may be arranged in more or less diagonal groups. In the first case the colors would appear in gradation from one end of the planting to another, and in the second case there would appear a blending and mingling of the tints by the running together of the plantings. If thought is given to each of these arrangements variation to an almost endless extent can be made.

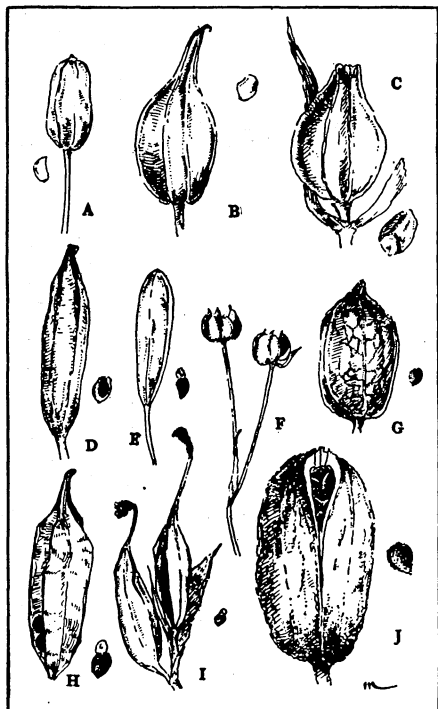


FIG. 42.—Iris seed pods and seeds: A, *Iris sibirica*; B, *I. spuria*; C, *I. foliosa*; D, *I. ensata*; E, *I. dichotoma*; F, *I. gracilipes*; G, *I. tectorum*; H, *I. korolkowi*; I, *I. arenaria*; J, *I. trojana*

PROPAGATION

Although mention has been made from time to time of the propagation of the various sorts as they were described, a review of the general method should be made.

PRODUCTION FROM SEEDS

Nearly all wild irises produce seeds (fig. 42) with considerable freedom, and this forms one of the most satisfactory ways of obtaining the species, many of which are collected and transported with difficulty because of their scanty root systems or slender rhizomes, which perish in transit.

In the neighborhood of Washington, D. C., the seeds of irises commence to ripen during the month of July, and except in the case of the late-flowering Japanese irises and the August

blooming *Iris dichotoma* the seeds of nearly all are ripe before the end of August.

Without exception the best time for planting iris seeds is immediately after their harvest. When the seed pods begin to turn yellow they should be watched carefully. Those that dehisce at the apex may be left on the plant until they commence to open, but those which dehisce laterally, as in *Iris arenaria* or *Iris korolkowi*, should be gathered before, as all the seeds are soon lost after the pod opens. The seed should be removed from the pod and left to dry off for several days. It should then be planted.

The practice of planting will depend somewhat upon the species. The Siberian irises, the English and American flag irises, the Japanese irises, and most of the Spuria group of irises germinate the spring following their planting. The same is true of most of the bearded irises both in self-set or hybrid seed if the planting is immediate. Members of the California group of irises have ger-

minated very irregularly in the experience of the writer, as have the few seeds of *Regelia* irises he has handled. The same is said to be true of the seeds of *Oncocyclus* species and varieties. If iris seed is not sown promptly the germination appears to become irregular and is at times greatly delayed, all of which points to the value of immediate planting. The writer has planted both in open ground and in pots kept in a frame, and aside from a possible convenience in handling has found no advantage in the latter method.

As the seeds of nearly all sorts have a hard shell, the freezing and thawing of winter are a distinct advantage and should not be guarded against unless there is danger of the seeds being heaved out of the soil.

The seeds should be covered about twice their depth and may be planted very thickly (fig. 43.). As soon as they can be handled after germination the young plants should be pricked out into the positions where they are to remain until flowering. It is very important that they should be transplanted promptly (fig. 44) and that they grow quickly, because with unimpeded growth they usually reach a sufficient size to blossom the year following germination in the case of the bearded irises. The beardless species commonly require two years to reach flowering size, and the *Regelia*, *Oncocyclus*, and bulbous irises a still longer time.

All the species are truly reproduced from seed and show only such variations of color, form, and stature as one might expect to find throughout the range of the plant in nature.

Garden varieties for the most part do not reproduce themselves from seed. The Siberian irises, which are usually self-pollinated, commonly reproduce their color variations dependably. The bearded irises vary conspicuously even when fertilized with their own pollen. This is the inevitable result of their mixed ancestry.



FIG. 43.—Iris seedlings in pot

Owing to the revival of interest in the bearded iris, many people are now raising seedling irises of this kind. The writer has raised hundreds, possibly thousands, and of them all relatively few have been distinct and desirable. After the first few years of experimentation, however, the seedlings in the strain developed showed a markedly high quality, and if the grower wishes to raise flowers only for his own use this becomes a fascinating way of securing distinct and beautiful sorts.

DIVISION OF THE ROOTS

Nearly all irises can be increased by division of the roots. The bulbous sorts divide, and the small bulbs which form about the base

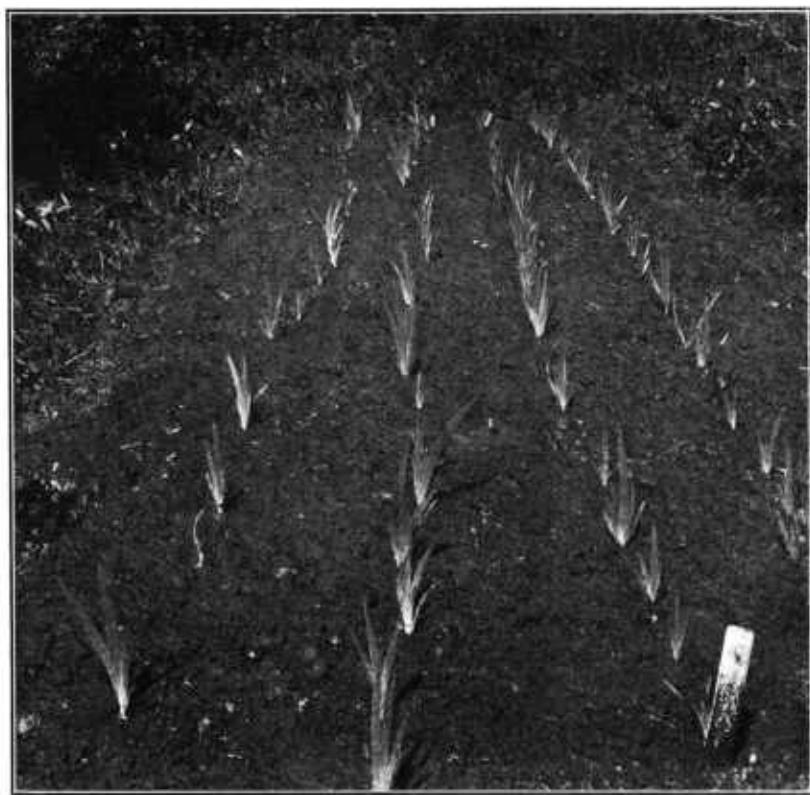


FIG. 44.—Young seedlings of Pogoniris

may be removed and grown to flowering size. The sorts which grow from rhizomes are more easily managed. An iris rhizome grows along with annual growths until it produces its terminal flower stalk. In order to carry on the growth at least one lateral branch is produced on either side of the bloom stalk, and these grow on until they in turn flower and produce branches. Figure 45 explains this method of growth diagrammatically and Figure 46 illustrates a root marked for division, which shows that growth is actually less regular.

When the propagator takes such a root he cuts it as indicated in Figure 47. The terminal portions will continue immediate growth from the already developed leaf shoots. The remaining portions will produce growths from various dormant buds along the rhizome.

Because a rhizome is morphologically a stem (fig. 48), it bears dormant buds which could produce new stem growth at the base of every leaf. Theoretically, therefore, if the rhizome were cut into small sections, each with a dormant bud, there would be a plant resulting from each portion. In actual practice this is not altogether successful, and such extensive propagation would so weaken the strength of the variety that it would show a marked decline in constitutional vigor.

For garden purposes, therefore, a moderate rate of division should be practiced, and the operation should not be repeated more often than is required, usually every third year.

In plants where the rhizomes are more slender or where they are crowded into close masses, as among the apogons, the parts are too

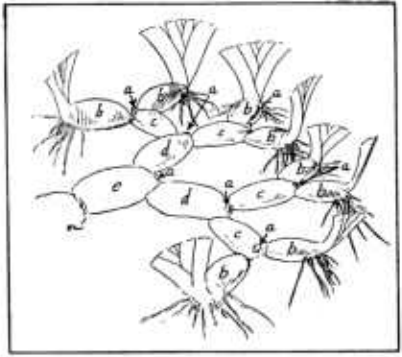


FIG. 45.—Diagram showing the growth of a rhizome: *a*, Scars of bloom stalks; *b*, current year's growth; *c*, preceding year's growth; *d*, growth of second year preceding; *e*, growth of third year preceding.

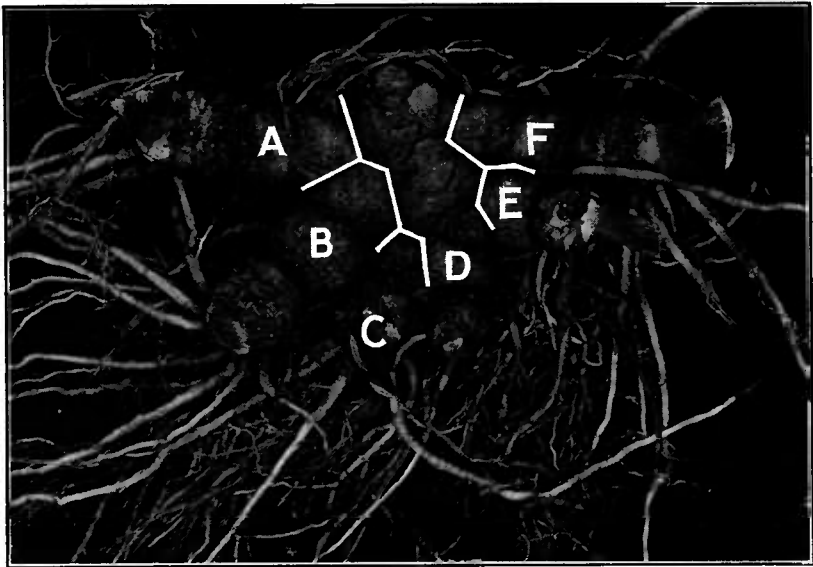


FIG. 46.—An iris rhizome marked for division

small to make a division into sections practicable. In such cases the clumps are best lifted, the earth shaken away, and the mass divided with a sharp spade or heavy knife.

The bearded irises should be divided immediately after flowering, in order that the new pieces may establish themselves in time to produce the embryonic flowers for the next season before frost comes. The beardless irises may be divided at the same time; but in the experience of the writer and of many others spring is a better time for both beardless and crested irises, and if they can be lifted and divided just as growth commences the success is even greater. In all cases where irises are lifted in leaf, the foliage should be cut back

to reduce the evaporating surface (fig. 48).

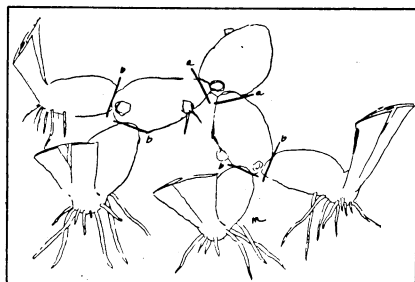


FIG. 47.—Diagram for division of rhizomes.
For moderate division break apart at *a*,
for full division break apart at *b*

It should be remembered that when one is transplanting any plant in his own garden and can move it quickly from one situation to another, it is possible to do rather more as one pleases than when receiving plants from a nursery. The writer knows from actual experience that plants can be moved but not propagated at practically any time of year when the ground is not frozen. This requires extra

care in watering, shading of tops, and mulching of roots, but except in unusual instances is not worth the effort involved.

HYBRIDIZATION

For the benefit of those who may wish to experiment with hybridization, Figure 49 shows diagrammatic flowers of irises of the *Apogon* and *Pogoniris* sections with the structural parts named. As the iris flower is built upon the plan of threes, examination will show three parts of each kind.

Cross-pollination is accomplished by the transfer of the pollen of one flower to the stigma of another. As the parts in the iris are large, the simplest practice is to carry the stamen of the desired male parent in the fingers and holding back the crest of the style branch with the fingers of the left hand scrape the pollen from the stamen held in the right hand upon the upper surface of the stigmatic lip in the flower to bear the seed. A little practice will bring expert results and rapid operation. A small pair of forceps is useful to pluck out the desired stamens in case the pollen-bearing flower must not be mutilated.

The best results appear to come from newly opened flowers fertilized with fresh pollen and from flowers pollinated before the heat of the day has become intense. Any moisture of dew or rain upon the stigmatic lip makes that flower quite useless for fertilization.

As the insects which visit the iris for its nectar very commonly, in the observation of the writer, go to the flower at the point of juncture of its segments with the perianth tube and drain the nectaries without disturbing the pollen-bearing stamen, there is relatively little insect pollination. For that reason no effort is made to bag the flowers or to prevent insect visits. The stamens of the

seed-bearing flower are removed, however, before there is any pollen shed from them.

IRISES AT FLOWER SHOWS

Irises have come into such great popularity that they are one of the favorite flowers displayed either in exhibitions of spring flowers or in shows devoted entirely to them. The latter type of exhibition has been fostered by the American Iris Society, which through its patronage and publications has made itself felt in many communities. It is not within the scope of this bulletin to outline plans for holding of such exhibitions, as the routine of any exhibition is clearly detailed in Department Circular No. 62, "Horticultural Exhibitions and Garden Competitions."

It is pertinent, however, to discuss briefly the characteristics which enter into the selection of flowers for exhibition, for these qualities should be the guide in selecting varieties for growth at home.

There is no hard and fast schedule which can apply equally to all varieties aside from schemes of judging the general qualities of the flower. To these must be added the qualities of growth which determine the plant's garden value for most people. All plants do not grow with equal vigor or with equal effect. For example, Black Prince is a variety which is notorious for its lack of vigor, and Princess Victoria Louise is

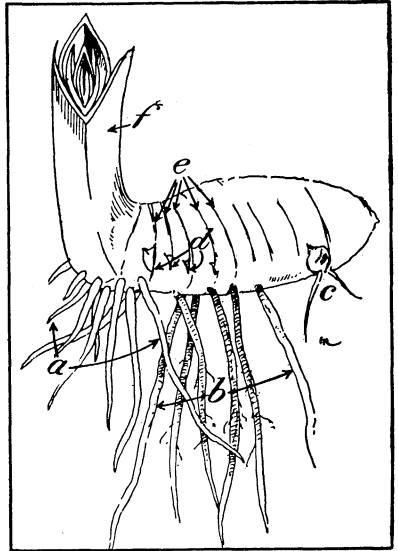


FIG. 48.—Rhizome of iris in autumn: *a*, New roots; *b*, roots formed in previous spring; *c*, shoot developing from bud in axil of leaf now dead; *d*, undeveloped buds in axils; *e*, scars of dead leaves; *f*, existing leaves cut back for transplanting

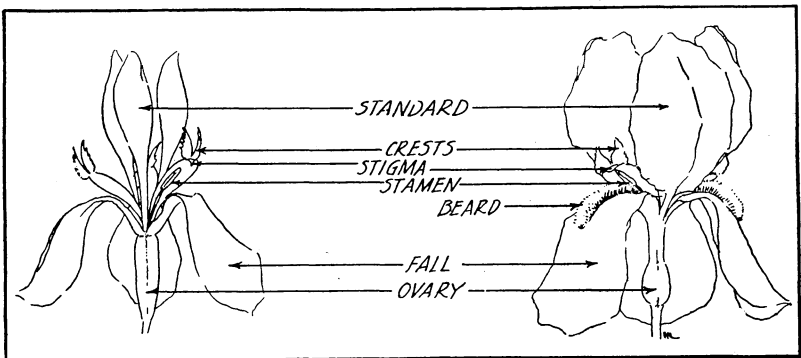


FIG. 49.—Diagram of parts of iris flower

so vigorous that it becomes almost weedlike in its increase. To illustrate the other point, the variety Gajus may be chosen as an

example of the varieties which make small rhizomes, so that a clump may be much divided and contain many blooming points and yet come within a small area. The Alcazar variety makes large rhizomes that bloom as freely as those of Gajus but which appear to be less floriferous because clumps of equal size produce fewer stalks of bloom. This apparent difference is somewhat offset in this case because Alcazar bears flowers several times larger than those of Gajus, but this is not true of every variety which grows from large rhizomes.

It has already been pointed out that varieties grow differently in various parts of the country, and if a variety is successful in one locality it is an indication rather than a guaranty of its success elsewhere. Every grower must experiment to a degree, and by comparing notes with his neighbors can find out what varieties are not suited to his locality.

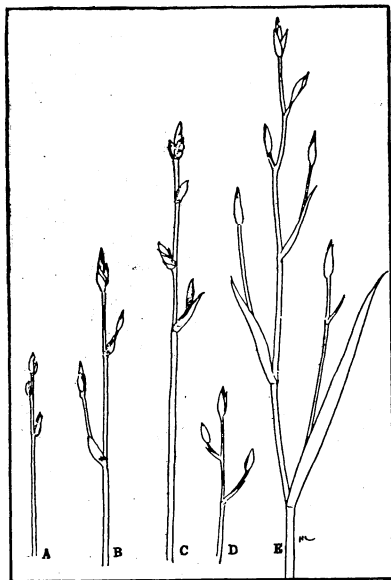


FIG. 50.—Types of stalks: A, *Iris cengialti*; B, *I. germanica*; C, *I. pallida*; D, *I. variegata*; E, *I. trojana*

some imported varieties and is said to be true of some American introductions grown abroad.

In the writer's experience it has been noted that varieties in which the blood of *Iris cengialti* is dominant bear many flowers, an average of 5 to 8. The branches, if existent, are short, and the pretty flowers make an imposing array on the slender stems (fig. 51). *Iris pallida* commonly bears many flowers on a stalk, averaging 8 to 14. This character is also present in the plicata varieties, which may be no more than color variants of *Iris pallida* in their original forms, and it is carried over into such crossbred varieties as Afterglow and Quaker Lady. Varieties of pure variegata origin show great variation in number of blooms. Varieties like Honorable carry many blooms, whereas those like Iris King, which is not a pure variegata, have relatively few flowers. Some wild forms of variegata from collected European plants show excessive floriferousness, which is accentuated by the shortness of the stalks bearing the small flowers.

Another point to be considered in examining the free-flowering qualities of a variety is the number of flowers which are borne upon a stalk. As the life of each bloom rarely exceeds three days at the maximum, it is obvious that a variety that bears but 6 flowers will appear much less floriferous than one which carries 14 blossoms. Figure 50 shows the type of flower stalk borne by various types of bearded irises, which is an indication of their floriferousness. It must be remembered that this is a factor which will vary with climate and location. Many disappointments have come because varieties have failed to repeat advertised performances in new localities. This has been particularly true of

Derivatives of *Iris macrantha* often carry few flowers. This is not always true, as *Oriflamme* averages 8 to 10 blossoms. Lord of June does not carry so many, rarely exceeding 6, and the writer has many seedlings with most beautiful flowers that never bear more than 5 blossoms to the stalk. Derivatives of *Iris trojana*, the other species which has fathered the modern large-flowered iris, carry for the most part many flowers to the stalk on widely branched stems which display the blooms ideally.

For landscape work, however, the best effects will be found from the varieties in which *pallida* and *variegata* blood predominates, whether mixed or pure, as these varieties bear their blossoms in profusion and produce the flower stalks so close together that a greater visual effect is obtained. If the planting is one of smaller area, to be viewed near at hand, there is no need for this limitation.

The selection of varieties will depend considerably upon personal taste. There are, however, various conventional points upon which there should be little difference of opinion.

When one examines a flower he commonly considers its size, color, substance, form, and scent. With the exception of the last, each of these factors must be considered with relation to others.

The size of a flower is one of the most dangerous features in discussion. There are persons who are always impressed by size, regardless of the presence or absence of other features. In the iris garden there is a proportion of visitors who always go to the plants of Lord of June and return to it from all others, regardless of the fact that it rarely produces a flower of sufficient substance to keep its form. Again, there are persons to whom a lack of size is a desirable feature and who find their chief pleasure in contemplating minute details. Probably there should be some middle ground. Certainly size or lack of it should never be the determining feature. The two features which should be present and considered always in connection with size are substance and form. Substance has to do with the thickness of the petals, with their firmness or lack of it. Obviously a plant with large petals must have a firmer substance than one with smaller petals in order to hold the shape of the flower. If anyone doubts the importance of this, let him examine a well-flowered clump of varieties, such as *Kharput* or *Fontarabie*, and notice the untidy and wilted appearance that comes from the collapsed standards. Compare these with the firm standards of such



FIG. 51.—*Iris cengialti* var. *Sappho*

varieties as Koya or Dalmatica, and the resulting conviction will be inevitable.

If, then, we have a flower of sufficient substance to keep it in perfection, how much must its form contribute? This is relatively less important in connection with the matter of size and is more important as considered later in its major significance. At this point, however, it is enough to suggest that there must be a proper relation between the development of the parts so that top-heavy shapes do not appear. A flower in which the standards are overdeveloped has a form that is balloonlike and ungraceful in the extreme. This is especially apparent in varieties where the falls clasp the stem and appear smaller than they are. Tamerlan is a typical example.

Substance, as said before, has to do with the thickness or thinness of the petal tissue. In iris flowers the fault usually lies in the thinness rather than thickness of petals, and the importance of adequate thickness has been remarked. With substance is commonly considered the texture of the petal surface. This has to do with the smoothness of the tissue. Nearly all varieties have texture of satin smoothness, but occasionally there is a variety with a rough surface. The intermediate Gerda shows considerable roughness of surface, and the variety Zua has a texture so craped and cockled that it becomes the distinguishing feature of the flower.

Fragrance is commonly present in most varieties, but is conspicuous in the pallida irises and even more so among the progeny of *Iris trojana*. The varieties Caterina and Mandalay are exquisitely scented. Fragrance is certainly an addition to any flower, but the lack of it can hardly be considered a serious fault.

Color is a difficult matter to describe. On general principles careful judges require that self-colored varieties should have clear distinct colors, blended varieties the combination of harmonious tints, and bicolor varieties colors that contrast pleasantly. But quite aside from this, there can be found a champion for nearly every hue and tint alone and in combination, and it is true that even the most curious and dull can be made to look well if they are combined with the proper colors and shown in the proper lights.

The remaining factor, form, is difficult to consider. It deals with the relation of the parts of the flower one to another and their arrangement and carriage in the flower as a whole.

The standards are variously arranged in the flower, in one extreme lying flat almost in a plane with the falls, as in the varieties Clematis and Japanesque; cupped, as in Oriflamme or Merlin; tips adpressed, as often in Madame Chereau; domed, as in Kharput; overarched, as in Lord of June; and conic, as in Monsignor or Empire. The personal preference of the writer is always for blooms with the overarched or conic arrangement of the standards, though there are some cupped flowers that are very attractive.

The falls may be held horizontally, as in some of the variegatas; with a pleasant flare, as in Iris King; straight hanging, as in Isoline or Alcazar; and reflexed, as in Tamerlan.

Aside from the carriage of these parts as they are described, it is important to note how each segment appears in itself. There is a strong group of veins through the center of each, and there is a tendency for the segment to curve away from this. Those which

are smooth or curve slightly usually present the best appearance. At times, as in varieties like Madame Chereau, the revolute character of the petal together with the ruffled edge gives a light and airy appearance that is delicate and pleasing. This is rarely true if it appears in the lower segments, and varieties like Isoline and Tamerlan suffer from it most decidedly.

Again there occurs in some sorts a pinching of the fall just below the end of the beard that gives a most unpleasant appearance. Sometimes this is present in Baronet, and it certainly shows in the photographs of such distinguished varieties as E. H. Jenkins and Phyllis Bliss.

After a careful study of flower forms in all the iris varieties one develops a sense of fitness which governs his judgment, producing no fixed image of what the ideal flower should be but rather giving a somewhat flexible standard by which nearly all varieties can be measured. Soon all will be found embodied in one or two commercial sorts, which can then become the standards of comparison for the individual.

DISEASES AND INSECT PESTS

DISEASES

The culture of the iris presents little difficulty to the gardener in the matter of diseases and insect pests.

The least serious of all are the species of rust and of leaf-spot that are found. The writer has had but little experience with rust (*Puccinia iridis* (DC.) Wallr.) and has been unable to discover any other garden where it has been a serious matter. It occurs on the leaves as small pustules of dull rust color and makes a very untidy appearance. No effort has been made to eradicate it, and the prescribed treatment of a spray of liver of sulphur is repeated on the authority noted.¹

Leaf-spot (*Heterosporium gracile* Saccardo) is much more prevalent than rust in gardens known to the writer, and in the climate of Washington, D. C., makes its worst outbreak just after the time of flowering, so that, together with the natural dying of the foliage, the appearance of the plants becomes very unsightly. This is especially notable in the derivatives of *Iris trojana* and *Iris mesopotamica*, which tend to lose their leaves during summer when in the best of health. The new growths produced in autumn rarely show the blotches, and the spring growth is not disfigured until after the blooming season.

The writer removes and burns all the diseased leaves as soon as noted and in the case of bad outbreaks cuts off the upper portions of the leaves, as is done at transplanting time. This answers rather well, as the outbreak is confined commonly to the upper part of the leaves. A spray of ammoniacal copper carbonate is useful in checking the spread of the disease.

Iris root-rot, which is the result of a bacterium (*Pseudomonas iridis* Van Hall), is a serious difficulty in some gardens. This makes itself known by the falling of the fans of foliage at the crown. Upon examination they will be found soft and coming off the

¹ Dykes, W. R. The genus *Iris*, p. 16. Cambridge (Eng.), 16 p. 1913.

plant easily. The rhizome itself is commonly decayed, leaving a custardlike mass which gives off an offensive and unmistakable odor. The plant should be lifted, all the soft portions cut away into firm tissue, and the rhizome treated with some disinfectant. The writer prefers to leave the rhizome exposed to the sunlight for a day or two and to replant in a fresh location, but as an additional precaution he has used very dilute solutions of potassium permanganate, which appear to burn out all infected matter. If the plants can be kept growing in full sunlight for at least one season after the attack, there is not much chance of a reappearance of the disease unless by a re-infecting from without. The disease seems most virulent in the varieties with large rhizomes, especially the *trojana* and *mesopotamica* derivatives.

INSECT PESTS²

The iris borer (*Macronoctua onusta* Grote; fig. 52) is the most serious of the various insects which are known to attack irises. Recent records in the Bureau of Entomology indicate that it occurs in New York, Pennsylvania, Ohio, Maine, Connecticut, Illinois, and Iowa, while garden records add Massachusetts, Maryland, and California to this list. The moth apparently lays its eggs in the fall near or on the basal leaves. According to literature, the over-



FIG. 52.—Adult moth of the iris borer

wintering eggs hatch in the spring, in April in the neighborhood of Washington, D. C., and the young larvæ eat their way downward inside of the leaves toward the rhizome, where they continue feeding in the older woody portions (fig. 53), sometimes catting out the growing point and destroying the plant. In the early stages their presence may be recognized by the bleeding of the plant, which shows between the folds of the leaves as a wet stain. Later in the season the leaves become stunted and darkened. By late summer, if the plants are dug, the actual burrow can be found in the woody rhizome.

It sometimes happens that the bacterial rot already described occurs with the attack of the borer, making the destruction of the plant more complete. Reports of this character have come chiefly from nurseries where irises are grown in field culture.

By July or August the developing larvæ will reach maturity and are then about an inch and a half long, whitish with a pronounced pinkish tinge above the spiracles. Pupation takes place in the soil near the base of the plants usually in August or September, depending on the locality. The pupa is shiny chestnut-brown in color. The adult moth is short lived, and the female lays her eggs soon after emergence.

² This statement has been approved by C. A. Weigel, Bureau of Entomology, United States Department of Agriculture.

While many varieties and species of iris seem susceptible to attack, the writer of this bulletin has observed such species as *Iris chrysographes*, *Iris bulleyana*, and *Iris wilsoni* to be seriously injured by it, with complete loss in some cases. *Iris sibirica* is often seriously crippled, and occasionally *Iris pseudacorus* is demolished, but the Pogoniris sorts rarely succumb to it, nor do the irises related to *Iris foliosa*.



FIG. 53.—Iris borers at work

Control.—In small gardens, especially in plantings of very expensive varieties, many plants may be saved from serious injury by the laborious method of hand picking. If the plants are examined as they push into active growth and all leaves which show the characteristic wound are squeezed firmly between the thumb and fore-

finger, commencing at the ground and pulling upward, the small larvæ are killed and the growth of the plant is not seriously affected. In large plantations, such as nurseries, this method is scarcely practicable. Here infested plants should be lifted in July and August, examined carefully, and all unsound portions cut out and destroyed, preferably by burning, together with the larvæ present. To prevent subsequent infection by any disease the cut surfaces of the rhizome should then be treated as suggested under iris root-rot. Late fall burning of the plantations is suggested by some growers, but this practice is open to objection, since injury to the rhizomes is likely to follow in some cases. Cutting off all particles of leafage as close to the ground as possible and then raking and burning them in order to get rid of the eggs is suggested by some growers. This practice removes the source of infestation for the next year but is hard on the vigor of the plants.

Cutworms cause great trouble in seedling beds. When such conditions exist scatter about the infested beds a poison bran mash prepared according to the following formula:

$\frac{1}{4}$ pound white arsenic.
1 peck dry bran.

1 pint sirup of molasses.
4 to 6 quarts water.

The white arsenic and dry bran are first mixed thoroughly in a container. In another vessel stir a pint of cheap molasses or sirup into 4 to 6 quarts of water. Then prepare a mash by slowly adding the mixture of sirup and water to the poisoned bran. Allow it to stand for several hours, to permit the bran to take up the arsenic. Scatter thinly over the surface of the soil after sundown.

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